

**Heavy metal contents in some edible seaweeds (Wakame, Kombu) in Japan**  
(日本の食用海藻 (ワカメや昆布) 中の重金属含有量)

Hokkaido University, Graduate School of Environmental Science  
Division of Environ. Sci. Devel., Course of Global Environmental Management  
Mosusu, Eileen Taroama

In developing countries such as Papua New Guinea, the dumping of mining waste into the deep sea is often, and there is concern about marine pollution of heavy metal elements. It is well known that the concentration of heavy metal elements in green algae indicates heavy metal pollution in seawater. However, several studies have been on brown algae such as kombu and wakame. This current study focuses on the analyses of fourteen heavy metal concentrations (V, Se, Mn, Fe, Cu, Zn, Mo, Co, Cr, Ni, Cd, Pb, Th, U) in 22 seaweed samples commercially sold in Japan. The algae-based products are Wakame (*Undaria pinnatifida*), Kombu (*Laminaria* spp.), Hijiki (*Hizikia fusiform*), and sea lettuce (*Ulva rigida*)

Overnight dried samples were grounded and digested by the ETHOS Microwave Digestion System and quantified using the Inductively Coupled Plasma Mass Spectrometry system (ICP-MS) in the Open facility of Hokkaido university. An evaluation of the samples against previous literature on seaweeds from different countries concluded that Japan's kombu and wakame samples showed lower metal concentrates. The sea lettuce samples contained the highest values of six metal elements (V, Mn, Co, Ni, Zn, and Pb). Hijiki samples indicated high in four metals (Th, Mo, Cu, and Fe) while Wakame and Kombu displayed three metals, respectively (Cr, Cd, Se, and U). Sourced areas were differentiated using packaging information from Japan, China, and Korea.

All kombu samples are from Hokkaido island area. Samples from off Nemuro are three times higher in copper, zinc, and cadmium than the other samples. This may reflect that the seawater at this site has higher concentrations of these heavy metals than seawater from other regions. In the wakame sample, Chinese seaweeds tend to contain higher nickel, cobalt, chromium, and cadmium levels than Japan. Heavy metal content in kelp and wakame, including iron and manganese, was found to vary widely and is a promising indicator of heavy metal contamination. In the future, it will be necessary to correlate the heavy metal concentrations with those in seawater and sediments at the various production sites.